```
BBBBBBBBBBBB        AAAAAAAAA        SSSSSSSSSSS  RRRRRRRRRRR     TTTTTTTTTTTTTTT  LLL
BBBBBBBBBBBB        AAAAAAAAA        SSSSSSSSSSS  RRRRRRRRRRR     TTTTTTTTTTTTTTT  LLL
BBBBBBBBBBBB        AAAAAAAAA        SSSSSSSSSSS  RRRRRRRRRRR     TTTTTTTTTTTTTTT  LLL
BBB          BBB   AAA       AAA   SSS           RRR         RRR       TTT        LLL
BBB          BBB   AAA       AAA   SSS           RRR         RRR       TTT        LLL
BBB          BBB   AAA       AAA   SSS           RRR         RRR       TTT        LLL
BBB          BBB   AAA       AAA   SSS           RRR         RRR       TTT        LLL
BBB          BBB   AAA       AAA   SSS           RRR         RRR       TTT        LLL
BBB          BBB   AAA       AAA   SSS           RRR         RRR       TTT        LLL
BBBBBBBBBBBB       AAA       AAA     SSSSSSSSS   RRRRRRRRRRR           TTT        LLL
BBBBBBBBBBBB       AAA       AAA     SSSSSSSSS   RRRRRRRRRRR           TTT        LLL
BBBBBBBBBBBB       AAA       AAA     SSSSSSSSS   RRRRRRRRRRR           TTT        LLL
BBB          BBB   AAAAAAAAAAAAAAA           SSS  RRR   RRR             TTT        LLL
BBB          BBB   AAAAAAAAAAAAAAA           SSS  RRR   RRR             TTT        LLL
BBB          BBB   AAAAAAAAAAAAAAA           SSS  RRR   RRR             TTT        LLL
BBB          BBB   AAA       AAA           SSS  RRR      RRR           TTT        LLL
BBB          BBB   AAAAAAAAAAAAAAA           SSS  RRR   RRR             TTT        LLL
BBB          BBB   AAA       AAA           SSS  RRR      RRR           TTT        LLL
BBB          BBB   AAA       AAA           SSS  RRR      RRR           TTT        LLL
BBB          BBB   AAA       AAA           SSS  RRR      RRR           TTT        LLL
BBBBBBBBBBBB       AAA       AAA   SSSSSSSSSSS   RRR         RRR       TTT        LLLLLLLLLLLLLLL
BBBBBBBBBBBB       AAA       AAA   SSSSSSSSSSS   RRR         RRR       TTT        LLLLLLLLLLLLLLL
BBBBBBBBBBBB       AAA       AAA   SSSSSSSSSSS   RRR         RRR       TTT        LLLLLLLLLLLLLLL
```

FILEID**BASUDFWF

```
BBBBBBBB      AAAAAA      SSSSSSSS  UU      UU  DDDDDDDD    FFFFFFFFFF  WW      WW  FFFFFFFFFF
BBBBBBBB      AAAAAA      SSSSSSSS  UU      UU  DDDDDDDD    FFFFFFFFFF  WW      WW  FFFFFFFFFF
BB      BB  AA      AA  SS        UU      UU  DD      DD  FF          WW      WW  FF
BB      BB  AA      AA  SS        UU      UU  DD      DD  FF          WW      WW  FF
BB      BB  AA      AA  SS        UU      UU  DD      DD  FF          WW      WW  FF
BB      BB  AA      AA  SS        UU      UU  DD      DD  FF          WW      WW  FF
BBBBBBBB    AA      AA    SSSSSS  UU      UU  DD      DD  FFFFFFFF    WW      WW  FFFFFFFF
BBBBBBBB    AA      AA    SSSSSS  UU      UU  DD      DD  FFFFFFFF    WW      WW  FFFFFFFF
BB      BB  AAAAAAAAAA        SS  UU      UU  DD      DD  FF          WW  WW  WW  FF
BB      BB  AAAAAAAAAA        SS  UU      UU  DD      DD  FF          WW  WW  WW  FF
BB      BB  AA      AA        SS  UU      UU  DD      DD  FF          WWWW  WWWW  FF          ....
BB      BB  AA      AA        SS  UU      UU  DD      DD  FF          WWWW  WWWW  FF          ....
BBBBBBBB    AA      AA  SSSSSSSS  UUUUUUUUUU  DDDDDDDD    FF          WW      WW  FF          ....
BBBBBBBB    AA      AA  SSSSSSSS  UUUUUUUUUU  DDDDDDDD    FF          WW      WW  FF          ....

LL            IIIIII      SSSSSSSS
LL            IIIIII      SSSSSSSS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II      SS
LL              II        SSSSSS
LL              II        SSSSSS
LL              II              SS
LL              II              SS
LL              II              SS
LL              II              SS
LLLLLLLLLL    IIIIII    SSSSSSSS
LLLLLLLLLL    IIIIII    SSSSSSSS
```

```
;     1          0001  0 MODULE BAS$$UDF_WF (                          ! BASIC Write Formatted UDF
;     2          0002  0                 IDENT = '1-013'              ! File: BASUDFWF.B32 Edit:PLL1013
;     3          0003  0                 ) =
;     4          0004  1 BEGIN
;     5          0005  1 !
;     6          0006  1 !*****************************************************************************
;     7          0007  1 !*                                                                           *
;     8          0008  1 !*  COPYRIGHT (c) 1978, 1980, 1982, 1984 BY                                 *
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;    24          0024  1 !*  SOFTWARE ON EQUIPMENT WHICH IS NOT SUPPLIED BY DIGITAL.                  *
;    25          0025  1 !*                                                                           *
;    26          0026  1 !*                                                                           *
;    27          0027  1 !*****************************************************************************
;    28          0028  1
;    29          0029  1 !++
;    30          0030  1 ! FACILITY:  BASIC Support Library - not user callable
;    31          0031  1 !
;    32          0032  1 ! ABSTRACT:
;    33          0033  1 !
;    34          0034  1 !       Perform the User data formatting required for Basic Print Using.
;    35          0035  1 !
;    36          0036  1 ! ENVIRONMENT:  User access mode; reentrant AST level or not.
;    37          0037  1 !
;    38          0038  1 ! AUTHOR:       Donald G. Petersen;     CREATION DATE: 14-May-79
;    39          0039  1 !
;    40          0040  1 ! MODIFIED BY:
;    41          0041  1 !
;    42          0042  1 ! 0-001 - original.  DGP 14-May-79
;    43          0043  1 ! 1-002 - Change linkage of BAS$$UDF_WF0.  DGP 22-May-79
;    44          0044  1 ! 1-003 - Pass a null return string to the format interpreter.  DGP 31-May-79
;    45          0045  1 ! 1-004 - Format string reversion must be handled here.  DGP  01-Jun-79
;    46          0046  1 ! 1-005 - Change the output routine which takes care of the string returned
;    47          0047  1 !         by the format interpreter.  DGP 04-Jun-79
;    48          0048  1 ! 1-006 - Remove the unused reference to STR$COPY.  JBS 16-JUL-1979
;    49          0049  1 ! 1-007 - Make format reversions always start a new record.  DGP 01-Aug-79
;    50          0050  1 ! 1-008 - Update cursor position.  DGP 02-Aug-79
;    51          0051  1 ! 1-009 - Set temp string pointers to 0 initially.  DGP 18-Sep-79
;    52          0052  1 ! 1-010 - Pick up the scale factor from the ISB and pass it to the format
;    53          0053  1 !         interpreter.  DGP 25-Nov-79
;    54          0054  1 ! 1-011 - Make PRINT USING look at the right margin.  DGP 25-Jan-80
;    55          0055  1 ! 1-012 - When the print line exceeds the buffer, a CRLF should not be inserted
;    56          0056  1 !         as it currently is.  DGP 03-Feb-1981
;    57          0057  1 ! 1-013 - The format string descriptor must specify the class and dtype to
```

```
;    58          0058  1 !       satisfy the enhanced STR$ routines.  PLL 28-Sep-81
;    59          0059  1 !--
;    60          0060  1
;    61          0061  1 !<BLF/PAGE>
```

```
;    63          0062  1 !
;    64          0063  1 ! SWITCHES:
;    65          0064  1 !
;    66          0065  1
;    67          0066  1 SWITCHES ADDRESSING_MODE (EXTERNAL = GENERAL, NONEXTERNAL = WORD_RELATIVE);
;    68          0067  1
;    69          0068  1 !
;    70          0069  1 ! LINKAGES
;    71          0070  1 !
;    72          0071  1
;    73          0072  1 REQUIRE 'RTLIN:OTSLNK';                         ! define all linkages
;    74          0501  1
;    75          0502  1 !
;    76          0503  1 ! TABLE OF CONTENTS:
;    77          0504  1 !
;    78          0505  1
;    79          0506  1 FORWARD ROUTINE
;    80          0507  1     BAS$$UDF_WF0 : JSB_UDF0 NOVALUE,            ! initialization
;    81          0508  1     BAS$$UDF_WF1 : CALL_CCB NOVALUE,            ! format one user I/O list element
;    82          0509  1     BAS$$UDF_WF9 : JSB_UDF9 NOVALUE;            ! end of user I/O list - finish
;    83          0510  1
;    84          0511  1 BUILTIN
;    85          0512  1     CVTLD,                                      ! Escape to  CVTLD instruction
;    86          0513  1     MOVTUC;                                     ! Escape to  MOVTUC instruction
;    87          0514  1 !
;    88          0515  1 ! INCLUDE FILES:
;    89          0516  1 !
;    90          0517  1
;    91          0518  1 REQUIRE 'RTLML:BASPAR';                         ! Intermodule BASIC parameters and constants
;    92          0540  1
;    93          0541  1 REQUIRE 'RTLML:OTSISB';                         ! I/O statement block (ISB) offsets
;    94          0709  1
;    95          0710  1 REQUIRE 'RTLML:OTSLUB';                         ! Only needed to get LUB length!
;    96          0850  1
;    97          0851  1 REQUIRE 'RTLIN:OTSMAC';                         ! Macros
;    98          1045  1
;    99          1046  1 REQUIRE 'RTLIN:RTLPSECT';                       ! Define DECLARE_PSECTS macro
;   100          1141  1
;   101          1142  1 LIBRARY 'RTLSTARLE';                            ! STARLET library for macros and symbols
;   102          1143  1
;   103          1144  1 !
;   104          1145  1 ! EQUATED SYMBOLS:
;   105          1146  1 !
;   106          1147  1 !
;   107          1148  1 !       NONE
;   108          1149  1                                                 ! output stream
;   109          1150  1 !
;   110          1151  1 ! MACROS:
;   111          1152  1 !
;   112          1153  1 !       NONE
;   113          1154  1 !
;   114          1155  1 ! PSECT DECLARATIONS:
;   115          1156  1 !
;   116          1157  1 DECLARE_PSECTS (BAS);                           ! declare PSECTs for BAS$ facility
;   117          1158  1 !
;   118          1159  1 ! OWN STORAGE:
;   119          1160  1 !
```

```
;  120          1161  1 !       NONE
;  121          1162  1 !
;  122          1163  1 ! EXTERNAL REFERENCES:
;  123          1164  1 !
;  124          1165  1
;  125          1166  1 EXTERNAL ROUTINE
;  126          1167  1     BAS$$FORMAT_INT : NOVALUE,                  ! Basic format interpreter
;  127          1168  1     STR$FREE1_DX,                               ! Deallocate a dynamic string
;  128          1169  1     BAS$$DO_WRITE : JSB_DO_WRITE NOVALUE,       ! Output routine
;  129          1170  1     BAS$$REC_WF0 : JSB_REC0 NOVALUE,            ! initialize formatted output
;  130          1171  1     BAS$$REC_WF1 : JSB_REC1 NOVALUE,            ! write formatted
;  131          1172  1     BAS$$REC_WF9 : JSB_REC9 NOVALUE;            ! end formatted output
;  132          1173  1
```

```
;  134          1174  1 GLOBAL ROUTINE BAS$$UDF_WF0                  ! Write formatted UDF initialization
;  135          1175  1     : JSB_UDF0 NOVALUE =
;  136          1176  1
;  137          1177  1 !++
;  138          1178  1 ! FUNCTIONAL DESCRIPTION:
;  139          1179  1 !
;  140          1180  1 !       Initialize PRINT USING User data formatter (UDF)
;  141          1181  1 !
;  142          1182  1 ! FORMAL PARAMETERS:
;  143          1183  1 !
;  144          1184  1 !       NONE
;  145          1185  1 !
;  146          1186  1 ! IMPLICIT INPUTS:
;  147          1187  1 !
;  148          1188  1 !       LUB$V_AST_GUARD         Guard bit for AST reentrancy
;  149          1189  1 !       LUB$A_BUF_PTR           Pointer to next byte in user buffer
;  150          1190  1 !
;  151          1191  1 ! IMPLICIT OUTPUTS:
;  152          1192  1 !
;  153          1193  1 !       LUB$V_AST_GUARD         Guard bit for AST reentrancy
;  154          1194  1 !       LUB$A_BUF_BEG           Pointer to first byte of user buffer
;  155          1195  1 !       LUB$A_BUF_PTR           Adr of next byte of output
;  156          1196  1 !                               data buffer
;  157          1197  1 !       LUB$A_BUF_END           Adr of end of data buffer
;  158          1198  1 !       LUB$V_FORM_CHAR         indicates that last element transmitter ended in
;  159          1199  1 !                               a comma or semicolon format character
;  160          1200  1 !
;  161          1201  1 ! ROUTINE VALUE:
;  162          1202  1 ! COMPLETION CODES:
;  163          1203  1 !
;  164          1204  1 !       NONE
;  165          1205  1 !
;  166          1206  1 ! SIDE EFFECTS:
;  167          1207  1 !
;  168          1208  1 !       NONE
;  169          1209  1 !
;  170          1210  1 !--
;  171          1211  1
;  172          1212  2     BEGIN
;  173          1213  2
;  174          1214  2     EXTERNAL REGISTER
;  175          1215  2         CCB : REF BLOCK [, BYTE];
;  176          1216  2
;  177          1217  2     !+
;  178          1218  2     ! A guard bit is used to ensure AST reentrancy.  The bit is set to 1
;  179          1219  2     ! at the top of the routine, tested for 1 at the bottom of the routine,
;  180          1220  2     ! and set to 0 upon exitting.  If the test for 1 fails at the bottom of
;  181          1221  2     ! the routine, then an AST has gone off and used this routine possibly
;  182          1222  2     ! changing the buffer pointers. Therefore this routine will loop back and
;  183          1223  2     ! run itself again in its entirety.
;  184          1224  2     !-
;  185          1225  2
;  186          1226  2     DO
;  187          1227  3         BEGIN
;  188          1228  3
;  189          1229  3         !+
;  190          1230  3         ! Set the guard bit
```

```
;  191          1231  3          !-
;  192          1232
;  193          1233             CCB [LUB$V_AST_GUARD] = 1;
;  194          1234
;  195          1235             !+
;  196          1236             ! Call record level to get buffer pointers.
;  197          1237             !-
;  198          1238
;  199          1239             BAS$$REC_WF0 ();
;  200          1240
;  201          1241             !+
;  202          1242             ! set the beginning of the buffer if there is no format character pending
;  203          1243             !-
;  204          1244
;  205          1245             IF NOT .CCB [LUB$V_FORM_CHAR] THEN CCB [LUB$A_BUF_BEG] = .CCB [LUB$A_BUF_PTR];
;  206          1246
;  207          1247             !+
;  208          1248             ! Check the guard bit.  If it is now 0, then an AST has gone thru this routine
;  209          1249             ! Since the data base may have been altered in an unpredictable manner, it
;  210          1250             ! is necessary to redo the entire routine.  Note: in worst case processing,
;  211          1251             ! the run-time for this routine is essentially unbounded.
;  212          1252             !-
;  213          1253
;  214          1254         END
;  215          1255  2      UNTIL .CCB [LUB$V_AST_GUARD];              ! End of AST guard loop
;  216          1256
;  217          1257  2      CCB [LUB$V_AST_GUARD] = 0;
;  218          1258  1      END;


                                                                .TITLE  BAS$$UDF_WF
                                                                .IDENT  \1-013\

                                                                .EXTRN  BAS$$FORMAT_INT
                                                                .EXTRN  STR$FREE1_DX, BAS$$DO_WRITE
                                                                .EXTRN  BAS$$REC_WF0, BAS$$REC_WF1
                                                                .EXTRN  BAS$$REC_WF9

                                                                .PSECT  _BAS$CODE,NOWRT,  SHR,  PIC,2

                                        52  DD 00000 BAS$$UDF_WF0::
                                                                PUSHL   R2                                      ;  1174
                                    52      A0  AB  9E 00002    1$:         MOVAB   -96(R11), R2                ;  1233
                                    62          20  88 00006                BISB2   #32, (R2)                   ;
                                00000000G       00  16 00009                JSB     BAS$$REC_WF0                ;  1239
                            05      FE  AB      02  E0 0000F                BBS     #2, -2(CCB), 2$             ;  1245
                                    BC  AB  B0  AB  D0 00014                MOVL    -80(CCB), -68(CCB)          ;
                                    52      A0  AB  9E 00019    2$:         MOVAB   -96(R11), R2                ;  1255
                            E5              62  05  E1 0001D                BBC     #5, (R2), 1$                ;
                                            62  20  8A 00021                BICB2   #32, (R2)                   ;  1257
                                            04  BA 00024                    POPR    #^M<R2>                     ;  1258
                                                05 00026                    RSB                                 ;

; Routine Size:  39 bytes,    Routine Base:  _BAS$CODE + 0000

;  219          1259  1
```

```
;  221          1260  1 GLOBAL ROUTINE BAS$$UDF_WF1 (ELEM_TYPE, ELEM_SIZE, ELEM_ADR, FORMAT_CHAR        ! format character
;  222          1261  1     ) : CALL_CCB NOVALUE =
;  223          1262  1
;  224          1263  1 !++
;  225          1264  1 ! FUNCTIONAL DESCRIPTION:
;  226          1265  1 !
;  227          1266  1 !       Write formatted User Data Formatter.
;  228          1267  1 !       Accept an I/O element, format it, and put it in the record buffer.
;  229          1268  1 !       Calls record level processors to perform the actual I/O if the buffer
;  230          1269  1 !       is full or if non-forcible and end-of-record (no format character).
;  231          1270  1 !
;  232          1271  1 ! FORMAL PARAMETERS:
;  233          1272  1 !
;  234          1273  1 !       ELEM_TYPE.rlu.v         data type of the element
;  235          1274  1 !       ELEM_SIZE.rlu.v         size of the data element
;  236          1275  1 !       ELEM_ADR.rlu.r          adr of the data element to be written
;  237          1276  1 !                               Points to a descriptor for strings
;  238          1277  1 !       FORMAT_CHAR.rlu.v               type of format character which followed the data element
;  239          1278  1 !
;  240          1279  1 ! IMPLICIT INPUTS:
;  241          1280  1 !
;  242          1281  1 !       LUB$V_AST_GUARD         guard bit for AST reentrancy
;  243          1282  1 !       LUB$L_PRINT_POS         current cursor position
;  244          1283  1 !       LUB$V_OUTBUF_DR         indicates valid data in the output buffer.
;  245          1284  1 !       LUB$W_R_MARGIN          size of buffer specified in OPEN statement.
;  246          1285  1 !       LUB$V_FORM_CHAR         flag that a format character (',' or ';') was
;  247          1286  1 !                               seen on the last element.
;  248          1287  1 !       LUB$A_BUF_BEG           pointer to beginning of user buffer
;  249          1288  1 !       LUB$A_BUF_PTR           pointer to current position in the buffer.
;  250          1289  1 !       LUB$A_BUF_END           pointer to last byte of buffer + 1.
;  251          1290  1 !       ISB$B_SCALE_FAC         the 0 - -6 factor.
;  252          1291  1 !
;  253          1292  1 ! IMPLICIT OUTPUTS:
;  254          1293  1 !
;  255          1294  1 !       LUB$V_AST_GUARD         guard bit for AST reentrancy
;  256          1295  1 !       LUB$V_OUTBUF_DR         indicates valid data in output buffer
;  257          1296  1 !       LUB$V_FORM_CHAR         flag to indicate a format character was seen
;  258          1297  1 !       LUB$L_PRINT_POS         internal cursor position.
;  259          1298  1 !       LUB$A_BUF_PTR           next byte in the user buffer
;  260          1299  1 !
;  261          1300  1 ! ROUTINE VALUE:
;  262          1301  1 ! COMPLETION CODES:
;  263          1302  1 !
;  264          1303  1 !       NONE
;  265          1304  1 !
;  266          1305  1 ! SIDE EFFECTS:
;  267          1306  1 !
;  268          1307  1 !       If an AST goes off while we are in this routine and calls this routine,
;  269          1308  1 !       then this routine will be repeated upon return to the outer level.
;  270          1309  1 !       It will continue to be repeated until there are no more ASTs using this routine.
;  271          1310  1 !
;  272          1311  1 !--
;  273          1312  1
;  274          1313  2     BEGIN
;  275          1314  2
;  276          1315  2     EXTERNAL REGISTER
;  277          1316  2         CCB : REF BLOCK [, BYTE];
```

```
;  278          1317  2
;  279          1318  2          MAP
;  280          1319  2              ELEM_ADR : REF VECTOR;                  ! element is call-by-reference
;  281          1320  2
;  282          1321  2          LOCAL
;  283          1322  2              BUF_LENGTH,                             ! length of the output buffer
;  284          1323  2              BUF_END,                                ! the end of the print buffer
;  285          1324  2              RET_FORMAT_ADDR,                        ! points to next byte in format
;  286          1325  2                                                      ! string.  Returned by the format
;  287          1326  2                                                      ! interpreter.
;  288          1327  2              RET_STR_ADDR,                           ! Working storage in case the string
;  289          1328  2                                                      ! which is returned does not fit
;  290          1329  2                                                      ! in the buffer
;  291          1330  2              RET_STR_LENGTH,                         ! Working store in case the return
;  292          1331  2                                                      ! string is too long for the buffer.
;  293          1332  2              FORMAT_DSC : BLOCK [8, BYTE],           ! desc. for passing format string
;  294          1333  2                                                      ! to the format interpreter
;  295          1334  2              DSC : BLOCK [8, BYTE];                  ! dynamic string descriptor for
;  296          1335  2                                                      ! output from the format interpreter
;  297          1336  2
;  298          1337  2          !+
;  299          1338  2          ! This loop is to ensure AST reentrancy.
;  300          1339  2          !-
;  301          1340  2
;  302          1341  2          DO
;  303          1342  2              BEGIN
;  304          1343  2              CCB [LUB$V_AST_GUARD] = 1;
;  305          1344  2
;  306          1345  2              !+
;  307          1346  2              ! Allocate a null dynamic string for the format interpreter to return its hand-
;  308          1347  2              ! icraft in.  The string is allocated here so that this will be AST
;  309          1348  2              ! reentrant and it is dynamic so that the return string will always fit.
;  310          1349  2              !-
;  311          1350  2
;  312          1351  2              DSC [DSC$B_DTYPE] = DSC$K_DTYPE_T;
;  313          1352  2              DSC [DSC$B_CLASS] = DSC$K_CLASS_D;
;  314          1353  2              DSC [DSC$W_LENGTH] = 0;
;  315          1354  2              DSC [DSC$A_POINTER] = 0;
;  316          1355  2
;  317          1356  2              !+
;  318          1357  2              ! Toggle the format character flag appropriately so that IO_END will know
;  319          1358  2              ! whether or not to do a PUT.
;  320          1359  2              !-
;  321          1360  2
;  322          1361  2              CASE .FORMAT_CHAR FROM BAS$K_SEMI_FORM TO BAS$K_NO_FORM OF
;  323          1362  2                  SET
;  324          1363  2
;  325          1364  2                  [BAS$K_SEMI_FORM] :
;  326          1365  2                      CCB [LUB$V_FORM_CHAR] = 1;
;  327          1366  2
;  328          1367  2                  [BAS$K_COMMA_FOR] :
;  329          1368  2                      CCB [LUB$V_FORM_CHAR] = 1;
;  330          1369  2
;  331          1370  2                  [BAS$K_NO_FORM] :
;  332          1371  2                      CCB [LUB$V_FORM_CHAR] = 0;
;  333          1372  2                  TES;
;  334          1373  2
```

```
;  335          1374  3
;  336          1375  3          !+
;  337          1376  3          ! Call the format interpreter.  It will scan the format string, check its
;  338          1377  3          ! validity, and format this element according to the string.
;  339          1378  3          ! Check for a format string length of 0 and reset to the front of
;  340          1379  3          ! the string if necessary.  Format reversion always starts a new record
;  341          1380  3          ! by definition.  So, put the current record.
;  342          1381  3          !-
;  343          1382  3
;  344          1383  3          IF .CCB [ISB$W_LEN_REM] EQL 0
;  345          1384  3          THEN
;  346          1385  4              BEGIN
;  347          1386  4              BAS$$DO_WRITE();
;  348          1387  4              CCB [ISB$A_FMT_PTR] = .CCB [ISB$A_FMT_BEG];
;  349          1388  4              CCB [ISB$W_LEN_REM] = .CCB [ISB$W_FMT_LEN];
;  350          1389  4              END;
;  351          1390  3
;  352          1391  3          FORMAT_DSC [DSC$B_DTYPE] = DSC$K_DTYPE_T;
;  353          1392  3          FORMAT_DSC [DSC$B_CLASS] = DSC$K_CLASS_S;
;  354          1393  3          FORMAT_DSC [DSC$W_LENGTH] = .CCB [ISB$W_LEN_REM];
;  355          1394  3          FORMAT_DSC [DSC$A_POINTER] = .CCB [ISB$A_FMT_PTR];
;  356          1395  3          BAS$$FORMAT_INT (.ELEM_ADR, FORMAT_DSC, .ELEM_TYPE, DSC, RET_FORMAT_ADDR, .CCB [ISB$B_SCALE_FAC]);
;  357          1396  3
;  358          1397  3          !+
;  359          1398  3          ! Update the format pointer so that it now points to the next format
;  360          1399  3          ! field.
;  361          1400  3          !-
;  362          1401  3
;  363          1402  3          CCB [ISB$W_LEN_REM] = .CCB [ISB$W_LEN_REM] - (.RET_FORMAT_ADDR - .CCB [ISB$A_FMT_PTR]);
;  364          1403  3          CCB [ISB$A_FMT_PTR] = .RET_FORMAT_ADDR;
;  365          1404  3
;  366          1405  3          !+
;  367          1406  3          ! Now that the format interpreter has been called, the length of the for-
;  368          1407  3          ! matted item is known exactly.  It is time to determine if the item will
;  369          1408  3          ! fit into the output buffer.  If the item is too big, then it is put out
;  370          1409  3          ! in sections.  No check is made to see whether the buffer is already
;  371          1410  3          ! 'dirty'.  The assumption is made that since this is formatted output,
;  372          1411  3          ! it will be put out exactly as specified.
;  373          1412  3          !-
;  374          1413  3
;  375          1414  3          RET_STR_ADDR = .DSC [DSC$A_POINTER];
;  376          1415  3          RET_STR_LENGTH = .DSC [DSC$W_LENGTH];
;  377          1416  4          BUF_END = (IF .CCB [LUB$W_R_MARGIN] GTR 0
;  378          1417  4            THEN MIN(.CCB [LUB$A_BUF_END], .CCB [LUB$A_BUF_BEG] + .CCB [LUB$W_R_MARGIN])
;  379          1418  3            ELSE .CCB [LUB$A_BUF_END]);
;  380          1419  3          BUF_LENGTH = .BUF_END - .CCB [LUB$A_BUF_PTR];
;  381          1420  3
;  382          1421  3          UNTIL .CCB [LUB$A_BUF_PTR] + .RET_STR_LENGTH LEQ .BUF_END DO
;  383          1422  4              BEGIN
;  384          1423  4              CH$MOVE (.BUF_LENGTH, .RET_STR_ADDR, .CCB [LUB$A_BUF_PTR]);
;  385          1424  4
;  386          1425  4              !+
;  387          1426  4              ! Dump the contents of the buffer and update the length and
;  388          1427  4              ! the pointer into the returned formatted string.
;  389          1428  4              !-
;  390          1429  4
;  391          1430  4              CCB [LUB$A_BUF_PTR] = .BUF_END;
```

```
;  392          1431  4              BAS$$DO_WRITE (BAS$K_BUF_EXC);
;  393          1432  4              RET_STR_LENGTH = .RET_STR_LENGTH - .BUF_LENGTH;
;  394          1433  4              RET_STR_ADDR = .RET_STR_ADDR + .BUF_LENGTH;
;  395          1434  4              BUF_LENGTH = .BUF_END - .CCB [LUB$A_BUF_PTR];
;  396          1435  4              END;
;  397          1436
;  398          1437                 CH$MOVE (.RET_STR_LENGTH, .RET_STR_ADDR, .CCB [LUB$A_BUF_PTR]);
;  399          1438                 CCB [LUB$A_BUF_PTR] = .CCB [LUB$A_BUF_PTR] + .RET_STR_LENGTH;
;  400          1439          !+
;  401          1440          ! Update the current cursor position.
;  402          1441          !-
;  403          1442                 CCB [LUB$L_PRINT_POS] = .CCB [LUB$L_PRINT_POS] + .RET_STR_LENGTH;
;  404          1443                 CCB [LUB$V_OUTBUF_DR] = 1;
;  405          1444                 END
;  406          1445       2     UNTIL .CCB [LUB$V_AST_GUARD];                ! End of AST guard loop
;  407          1446
;  408          1447       2     !+
;  409          1448       2     ! Free the heap storage allocated.
;  410          1449       2     !-
;  411          1450       2
;  412          1451       2     STR$FREE1_DX (DSC);
;  413          1452       2     CCB [LUB$V_AST_GUARD] = 1;
;  414          1453       2     RETURN;
;  415          1454  1    2     END;                                         ! END of BAS$$UDF_WF1


                                                07FC 00000          .ENTRY  BAS$$UDF_WF1, Save R2,R3,R4,R5,R6,R7,R8,R9,-; 1260
                                                                            R10
                                          5E        1C  C2 00002          SUBL2   #28, SP
                                          5A    A0  AB  9E 00005          MOVAB   -96(R11), R10                           ; 1344
                                          57    FE  AB  9E 00009          MOVAB   -2(R11), R7                             ; 1366
                                          6A        20  88 0000D 1$:      BISB2   #32, (R10)                              ; 1344
                                      0C  AE 020E0000 8F  D0 00010          MOVL    #34471936, DSC                          ; 1354
                                             10   AE  D4 00018          CLRL    DSC+4                                   ; 1355
                                   02        01   10  AC  CF 0001B          CASEL   FORMAT_CHAR, #1, #2                     ; 1362
                                  000B     0006        0006  00020 2$:      .WORD   3$-2$,-
                                                                                   3$-2$,-
                                                                                   4$-2$
                                          67            04  88 00026 3$:      BISB2   #4, (R7)                                ; 1369
                                                        03  11 00029          BRB     5$
                                          67            04  8A 0002B 4$:      BICB2   #4, (R7)                                ; 1372
                                                    8D  AB  B5 0002E 5$:      TSTW    -115(CCB)                               ; 1383
                                                        12  12 00031          BNEQ    6$
                                               00000000G    00  16 00033          JSB     BAS$$DO_WRITE                           ; 1386
                                      80  AB        FF7C  CB  D0 00039          MOVL    -132(CCB), -128(CCB)                    ; 1387
                                      8D  AB        FF72  CB  B0 0003F          MOVW    -142(CCB), -115(CCB)                    ; 1388
                                      16  AE        010E  8F  B0 00045 6$:      MOVW    #270, FORMAT_DSC+2                      ; 1391
                                      14  AE          8D  AB  B0 0004B          MOVW    -115(CCB), FORMAT_DSC                   ; 1393
                                      18  AE          80  AB  D0 00050          MOVL    -128(CCB), FORMAT_DSC+4                 ; 1394
                                      7E        FF70  CB  98 00055          CVTBL   -144(CCB), -(SP)                        ; 1395
                                                  0C  AE  9F 0005A          PUSHAB  RET_FORMAT_ADDR
                                                  14  AE  9F 0005D          PUSHAB  DSC
                                                  04  AC  DD 00060          PUSHL   ELEM_TYPE
                                                  24  AE  9F 00063          PUSHAB  FORMAT_DSC
```

```
                                    0C  AC  DD 00066          PUSHL   ELEM_ADR
                00000000G   00          06  FB 00069          CALLS   #6, BAS$$FORMAT_INT
            50        80    AB        08  AE  C3 00070          SUBL3   RET_FORMAT_ADDR, -128(CCB), R0                 1402
              8D    AB                  50  A0 00076          ADDW2   R0, -115(CCB)
              80    AB        08  AE  D0 0007A          MOVL    RET_FORMAT_ADDR, -128(CCB)                          1403
              6E        10  AE  D0 0007F          MOVL    DSC+4, RET_STR_ADDR                                 1414
              58        0C  AE  3C 00083          MOVZWL  DSC, RET_STR_LENGTH                                 1415
                        D4  AB  B5 00087          TSTW    -44(CCB)                                            1416
                            19  13 0008A          BEQL    8$
              51        D4  AB  3C 0008C          MOVZWL  -44(CCB), R1                                        1417
              51        BC  AB  C0 00090          ADDL2   -68(CCB), R1
              50        B4  AB  D0 00094          MOVL    -76(CCB), R0
              51            50  D1 00098          CMPL    R0, R1
                            03  15 0009B          BLEQ    7$
              50            51  D0 0009D          MOVL    R1, R0
              59            50  D0 000A0 7$:      MOVL    R0, BUF_END
                            04  11 000A3          BRB     9$
              59        B4  AB  D0 000A5 8$:      MOVL    -76(CCB), BUF_END                                   1418
        04    AE      59        B0  AB  C3 000A9 9$:      SUBL3   -80(CCB), BUF_END, BUF_LENGTH               1419
              56        B0  AB  9E 000AF          MOVAB   -80(R11), R6                                        1421
        50            66            58  C1 000B3 10$:     ADDL3   RET_STR_LENGTH, (R6), R0
              59            50  D1 000B7          CMPL    R0, BUF_END
                            26  15 000BA          BLEQ    11$
        00    B6    00    BE        04  AE  28 000BC          MOVC3   BUF_LENGTH, @RET_STR_ADDR, @0(R6)           1423
              66            59  D0 000C3          MOVL    BUF_END, (R6)                                       1430
              50            08  D0 000C6          MOVL    #8, R0                                              1431
                  00000000G 00  16 000C9          JSB     BAS$$DO_WRITE
              58        04  AE  C2 000CF          SUBL2   BUF_LENGTH, RET_STR_LENGTH                          1432
              6E        04  AE  C0 000D3          ADDL2   BUF_LENGTH, RET_STR_ADDR                            1433
              56        B0  AB  9E 000D7          MOVAB   -80(R11), R6                                        1434
        04    AE      59            66  C3 000DB          SUBL3   (R6), BUF_END, BUF_LENGTH
                            D1  11 000E0          BRB     10$                                                 1421
        B0    BB    00    BE            58  28 000E2 11$:     MOVC3   RET_STR_LENGTH, @RET_STR_ADDR, @-80(CCB)    1437
              B0    AB            58  C0 000E8          ADDL2   RET_STR_LENGTH, -80(CCB)                    1438
              C8    AB            58  C0 000EC          ADDL2   RET_STR_LENGTH, -56(CCB)                    1442
                    57      FE    AB  9E 000F0          MOVAB   -2(R11), R7                                 1443
                    67            08  88 000F4          BISB2   #8, (R7)
                    5A      A0    AB  9E 000F7          MOVAB   -96(R11), R10                               1445
            03              6A            05  E0 000FB          BBS     #5, (R10), 12$
                                FF0B  31 000FF          BRW     1$
                                0C  AE  9F 00102 12$:     PUSHAB  DSC                                         1451
                  00000000G 00          01  FB 00105          CALLS   #1, STR$FREE1_DX
                    6A                  20  88 0010C          BISB2   #32, (R10)                              1452
                                        04  0010F          RET                                             1454

; Routine Size:  272 bytes,    Routine Base:  _BAS$CODE + 0027

;  416          1455  1
```

```
;  418     1456  1 GLOBAL ROUTINE BAS$$UDF_WF9                  ! I/O end for UDF level of Write Formatted.
;  419     1457  1     : JSB_UDF9 NOVALUE =
;  420     1458  1
;  421     1459  1 !++
;  422     1460  1 ! FUNCTIONAL DESCRIPTION:
;  423     1461  1 !
;  424     1462  1 !       Call the record level I/O end of list routine.  Reset the cursor position
;  425     1463  1 !       if a PUT was done
;  426     1464  1 !
;  427     1465  1 ! FORMAL PARAMETERS:
;  428     1466  1 !
;  429     1467  1 !       NONE
;  430     1468  1 !
;  431     1469  1 ! IMPLICIT INPUTS:
;  432     1470  1 !
;  433     1471  1 !       LUB$V_AST_GUARD         Guard for AST reentrancy
;  434     1472  1 !       LUB$V_FORM_CHAR         last element transmitter ended with a format char
;  435     1473  1 !
;  436     1474  1 ! IMPLICIT OUTPUTS:
;  437     1475  1 !
;  438     1476  1 !       LUB$V_AST_GUARD         guard for AST reentrancy
;  439     1477  1 !       LUB$L_PRINT_POS         current cursor position
;  440     1478  1 !
;  441     1479  1 ! ROUTINE VALUE:
;  442     1480  1 ! COMPLETION CODES:
;  443     1481  1 !
;  444     1482  1 !       NONE
;  445     1483  1 !
;  446     1484  1 ! SIDE EFFECTS:
;  447     1485  1 !
;  448     1486  1 !       This routine will loop back and reexecute if it detects that it was
;  449     1487  1 !       called by an AST while it was executing.
;  450     1488  1 !
;  451     1489  1 !--
;  452     1490  1
;  453     1491  2     BEGIN
;  454     1492  2
;  455     1493  2     EXTERNAL REGISTER
;  456     1494  2         CCB : REF BLOCK [, BYTE];
;  457     1495  2
;  458     1496  2     !+
;  459     1497  2     ! This outer loop is to detect an AST calling this routine while it is
;  460     1498  2     ! executing.
;  461     1499  2     !-
;  462     1500  2
;  463     1501  2     DO
;  464     1502  3         BEGIN
;  465     1503  3         CCB [LUB$V_AST_GUARD] = 1;              ! Initialize the guard bit
;  466     1504  3         BAS$$REC_WF9 ();
;  467     1505  3         ! Time to reset the cursor position to zero perhaps
;  468     1506  3
;  469     1507  3         IF NOT .CCB [LUB$V_FORM_CHAR] THEN CCB [LUB$L_PRINT_POS] = 0;
;  470     1508  3
;  471     1509  3         END
;  472     1510  2     UNTIL .CCB [LUB$V_AST_GUARD];               ! End of AST guard loop
;  473     1511  2
;  474     1512  2     CCB [LUB$V_AST_GUARD] = 0;
```

```
;  475          1513  1     END;


                                                52  DD 00000 BAS$$UDF_WF9::
                                                                 PUSHL   R2                              ; 1456
                                          52        A0    AB  9E 00002                 MOVAB   -96(R11), R2                    ; 1503
                                          62              20  88 00006 1$:             BISB2   #32, (R2)                       ;
                                                00000000G 00  16 00009                 JSB     BAS$$REC_WF9                    ; 1504
                                    03        FE    AB      02  E0 0000F               BBS     #2, -2(CCB), 2$                 ; 1507
                                                            AB  D4 00014               CLRL    -56(CCB)                        ;
                                          52        A0    AB  9E 00017 2$:           MOVAB   -96(R11), R2                    ; 1510
                                    E7    62              05  E1 0001B               BBC     #5, (R2), 1$                    ;
                                          62              20  8A 0001F               BICB2   #32, (R2)                       ; 1512
                                                          04  BA 00022               POPR    #^M<R2>                         ; 1513
                                                          05  00024                 RSB                                     ;

; Routine Size:  37 bytes,    Routine Base:  _BAS$CODE + 0137

;  476          1514  1
;  477          1515  1 END
;  478          1516  1
;  479          1517  0 ELUDOM



;                                   PSECT SUMMARY
;
;      Name                     Bytes                          Attributes
;
;  _BAS$CODE                      348  NOVEC,NOWRT,  RD ,  EXE,  SHR,  LCL,  REL,  CON,  PIC,ALIGN(2)


;                                 Library Statistics
;
;                                          --------- Symbols ---------      Pages       Processing
;      File                                Total    Loaded   Percent      Mapped      Time
;
;  _$255$DUA28:[SYSLIB]STARLET.L32;1         9776         7         0         581       00:01.2



;                                      COMMAND QUALIFIERS
;
;       BLISS/CHECK=(FIELD,INITIAL,OPTIMIZE)/NOTRACE/LIS=LIS$:BASUDFWF/OBJ=OBJ$:BASUDFWF MSRC$:BASUDFWF/UPDATE=(ENH$:BASUDFWF)
```

```
;  480          1518  0
; Size:         348 code + 0 data bytes
; Run Time:       00:15.5
; Elapsed Time:   00:34.1
; Lines/CPU Min:   5868
; Lexemes/CPU-Min: 36347
; Memory Used:  196 pages
; Compilation Complete
```

```
! End of module - BASUDFWF
```

BASUDFWF
LIS

BASSTRING
LIS

BASTERMIO
LIS

BASTRM
LIS

BASTAB
LIS

BASUDFRM
LIS

BASSYS
LIS

BASSTR
LIS

BASUDFR
LIS

BASUVRTUA
LIS

BASUDFWL
LIS

BASUNLOCK
LIS

BASUVECTOR
LIS

BASUAL
LIS

BASUIRTIO
LIS

BASUNWIND BASUPDATE
LIS

BASUEXTR2
LIS